

CLAIMS

What is claimed is:

- 1 1. A method for remotely manipulating vehicle elements, comprising:
2 coupling among a plurality of network elements including at least one
3 vehicle internetwork, at least one local site, and the Internet;
4 automatically providing secure interoperability among the plurality of
5 network elements in response to node information including configuration and
6 security information; and
7 remotely manipulating at least one function of the vehicle elements.
- 1 2. The method of claim 1, further comprising hosting the at least one vehicle
2 internetwork on at least one vehicle selected from a group consisting of automobiles,
3 trucks, aircraft, trains, motorcycles, and marine vessels.
- 1 3. The method of claim 1, further comprising coupling at least one gateway
2 node of the at least one local site to a remote user computer, wherein the at least one
3 gateway node is located on at least one site selected from a group consisting of a
4 home, a service station, a public parking lot, an automobile dealer facility, and an
5 automobile service facility.
- 1 4. The method of claim 1, wherein the at least one function includes vehicle
2 control functions, security functions, diagnostic functions, and network access
3 functions.
- 1 5. The method of claim 1, further comprising establishing communication
2 among the at least one node of a plurality of host vehicles.
- 1 6. The method of claim 1, further comprising supporting data transfer and
2 manipulation among the plurality of network elements using at least one coupling
3 among the at least one vehicle internetwork and at least one external network,
4 wherein the data includes vehicle assembly data, service data, diagnostic data,
5 maintenance data, maintenance history data, security data, vehicle position data,
6 vehicle operations profile data, operator profile data, fleet management data, fleet

7 reliability analysis data, electronic mail, entertainment software, and targeted
8 advertising data.

1 7. The method of claim 1, further comprising:
2 receiving a first type of data from the at least one vehicle internetwork;
3 performing diagnostic and prognostic analysis on the first type of data;
4 transmitting a second type of data to the at least one vehicle internetwork in
5 response to the diagnostic and prognostic analysis.

1 8. The method of claim 1, further comprising reprogramming at least one
2 element of the at least one vehicle internetwork using at least one Internet coupling

1 9. The method of claim 1, further comprising reconfiguring at least one element
2 of the a least one vehicle internetwork using at least one Internet coupling.

1 10. The method of claim 1, wherein the at least one vehicle internetwork
2 comprises at least one peripheral electronic device, wherein the at least one
3 peripheral electronic device includes at least one device selected from a group
4 consisting of climate control devices, actuator devices, position location devices,
5 Global Positioning System (GPS) devices, communication devices, cellular
6 telephony devices, personal digital assistants (PDAs), processing devices, diagnostic
7 devices, modems, pager devices, video devices, audio devices, multimedia devices,
8 electronic game devices, sensor devices, switch devices, anti-theft devices, device
9 subnetworks, and wireless local area network (LAN) devices.

1 11. The method of claim 1, further comprising supporting atomic transactions
2 among the plurality of network elements.

1 12. The method of claim 1, further comprising manipulating the node
2 information including configuration and security information to provide secure
3 interoperability among the plurality of network elements and at least one peripheral
4 electronic device.

1 13. The method of claim 1, wherein the at least one vehicle internetwork
2 comprises at least one vehicle bus that includes at least one bus selected from a
3 group consisting of at least one Original Equipment Manufacturer (OEM) bus, at
4 least one Automotive Multimedia Interface Consortium (AMI-C) bus, at least one
5 external network, at least one local development network, and at least one legacy
6 automotive bus selected from a group consisting of Audio Control Protocol (ACP)
7 buses and Standard Corporate Protocol (SCP) buses.

1 14. The method of claim 1, further comprising:
2 accessing the plurality of network elements using at least one local
3 development network; and
4 performing application upgrades, diagnostics, and programming, wherein the
5 at least one local development network supports manipulation and transfer of
6 entertainment software, wherein the entertainment software comprises at least one
7 entertainment feature selected from a group consisting of video, audio, movies,
8 television shows, music, games, and simulations.

1 15. The method of claim 1, wherein the at least one vehicle internetwork
2 comprises at least one interface port selected from a group consisting of Intelligent
3 Data Bus (IDB-C) ports, MOST ports, Institute of Electrical and Electronics
4 Engineers (IEEE) 1394 ports, On-Board Diagnostic-II (OBD-II) ports, Standard
5 Corporate Protocol (SCP) ports, Audio Control Protocol (ACP) ports, Bluetooth
6 ports, Personal Communications Service (PCS) ports, Global System for Mobile
7 Communications (GSM) ports, and local area network ports.

1 16. The method of claim 1, wherein providing secure interoperability further
2 includes distributing at least one function among the plurality of network elements
3 in response to a coupling of peripheral electronic devices to at least one vehicle bus
4 of the at least one vehicle internetwork.

1 17. The method of claim 1, wherein the at least one vehicle internetwork
2 includes at least one function selected from a group consisting of data processing,

6 least one communication physical layer including cellular telephony, wireline
7 telephone, satellite telephony, packet radio, microwave, optical.

1 24. The method of claim 1, further comprising distributing data processing
2 functions of at least one component of the at least one vehicle internetwork among a
3 plurality of processors.

1 25. The method of claim 1, further comprising automatically organizing the
2 plurality of network elements, wherein the automatic organizing comprises
3 automatically controlling data transfer, processing, and storage among the plurality
4 of network elements.

1 26. The method of claim 1, further comprising supporting at least one level of
2 synchronization among different subsets of the plurality of network elements,
3 wherein a first level of synchronization is supported among a first subset of the
4 plurality of network elements, wherein a second level of synchronization is
5 supported among a second subset of the plurality of network elements.

1 27. The method of claim 1, further comprising self-assembling the plurality of
2 network elements, wherein search and acquisition modes of the plurality of network
3 elements search for participating ones of the plurality of network elements, wherein
4 a determination is made whether each of the participating ones of the plurality of
5 network elements are permitted to join the vehicle internetwork using a message
6 hierarchy, wherein the plurality of network elements are surveyed at random
7 intervals for new nodes and missing nodes.

1 28. The method of claim 1, further comprising performing service discovery,
2 wherein service discovery comprises synchronizing at least one node, authenticating
3 the at least one node, determining at least one communication mode for the at least
4 one node, informing the at least one node of resources available among the plurality
5 of network elements.

1 29. The method of claim 1, further comprising collecting data among the
2 plurality of network elements, wherein at least one operation is performed on the
3 data in response to parameters established by a user, the at least one operation
4 selected from a group consisting of classification, routing, processing, storing, and
5 fusing.

1 30. The method of claim 29, wherein routing comprises selecting at least one
2 data type for routing, determining at least one communication type and at least one
3 communication coupling for routing, selecting at least one of the plurality of
4 network elements to which to route the selected data, selecting at least one route to
5 the selected at least one of the plurality of network elements, and routing the
6 selected at least one data type to the selected at least one of the plurality of network
7 elements.

1 31. The method of claim 29, wherein processing comprises selecting at least one
2 data type for processing, selecting at least one processing type, selecting at least one
3 of the plurality of network elements to perform the selected at least one processing
4 type, and transferring the selected at least one data type to the selected at least one of
5 the plurality of network elements using at least one route.

1 32. The method of claim 29, wherein storing comprises selecting at least one
2 data type for storage, selecting at least one storage type, selecting at least one of the
3 plurality of network elements to perform the selected at least one storage type, and
4 transferring the selected at least one data type to the selected at least one of the
5 plurality of network elements using at least one route through the plurality of
6 network elements.

1 33. The method of claim 29, wherein fusing comprises a first node transmitting
2 at least one query request to at least one other node, wherein the first node collects
3 data from the at least one other node in response to the at least one query request,
4 and processes the collected data.

1 34. The method of claim 1, wherein the plurality of network elements comprise a
2 plurality of application programming interfaces (APIs), wherein the APIs include
3 APIs for application support, database services, routing, security, network
4 management, and deployment.

1 35. The method of claim 34, wherein the plurality of APIs are layered, wherein
2 the plurality of APIs enable distributed resource management by providing network
3 resource information among the plurality of network elements, wherein information
4 transfer among the plurality of network elements is controlled using a synchronism
5 hierarchy established in response to the network resource information.

1 36. The method of claim 1, further comprising supporting at least one
2 communication mode selected from a group consisting of wireless communications,
3 wired communications, and hybrid wired and wireless communications.

1 37. The method of claim 1, further comprising coupling the at least one vehicle
2 internetwork to at least one remote computer through the plurality of network
3 elements, wherein the plurality of network elements further includes at least one
4 element selected from a group consisting of at least one station gateway, at least one
5 server, at least one repeater, at least one interrogator, and at least one network,
6 wherein the at least one network includes wired networks, wireless networks, and
7 hybrid wired and wireless networks.

1 38. The method of claim 1, wherein the remote manipulation is performed using
2 World Wide Web-based tools to data, code, control, and security functions.

1 39. The method of claim 1, wherein the plurality of network elements comprise a
2 plurality of node types, wherein the plurality of node types includes at least one node
3 of a first type and at least one node of a second type, wherein a first network having
4 a first node density is assembled using the at least one node of a first type, wherein a
5 second network having a second node density is assembled using the at least one
6 node of a second type.

1 40. The method of claim 1, further comprising transferring software and data
2 among the plurality of network elements, wherein the transfer is remotely
3 controllable, wherein the software and the data are downloadable from at least one
4 location selected from a group consisting of storage devices of the plurality of
5 network elements, external storage devices, and remote storage devices.

1 41. The method of claim 1, further comprising:
2 coupling the at least one vehicle internetwork to at least one diagnostic
3 device;
4 collecting vehicle data using the at least one diagnostic device; and
5 transferring the vehicle data to at least one remote computer using at least
6 one wireless coupling.

1 42. A computer readable medium containing executable instructions which,
2 when executed in a processing system, cause the processing system to remotely
3 manipulate vehicle elements by:
4 coupling among a plurality of network elements including at least one
5 vehicle internetwork, at least one local site, and the Internet;
6 automatically providing secure interoperability among the plurality of
7 network elements in response to node information including configuration and
8 security information; and
9 remotely manipulating at least one function of the vehicle elements.

1 43. The computer readable medium of claim 42, wherein the processing system
2 further manipulates vehicle elements by hosting the at least one vehicle internetwork
3 on at least one vehicle selected from a group consisting of automobiles, trucks,
4 aircraft, trains, and motorcycles.

1 44. The computer readable medium of claim 42, wherein the processing system
2 further manipulates vehicle elements by coupling at least one gateway node of the at
3 least one local site to a remote user computer, wherein the at least one gateway node
4 is located on at least one site selected from a group consisting of a home, a service

5 station, a public parking lot, an automobile dealer facility, and an automobile service
6 facility.

1 45. The computer readable medium of claim 42, wherein the at least one
2 function includes vehicle control functions, security functions, diagnostic functions,
3 and network access functions.

1 46. The computer readable medium of claim 42, wherein the processing system
2 further manipulates vehicle elements by establishing communication among the at
3 least one node of a plurality of host vehicles.

1 47. The computer readable medium of claim 42, wherein the processing system
2 further manipulates vehicle elements by supporting data transfer and manipulation
3 among the plurality of network elements using at least one coupling among the at
4 least one vehicle internetwork and at least one external network, wherein the data
5 includes vehicle assembly data, service data, diagnostic data, maintenance data,
6 maintenance history data, security data, vehicle position data, vehicle operations
7 profile data, operator profile data, fleet management data, fleet reliability analysis
8 data, electronic mail, entertainment software, and targeted advertising data.

1 48. The computer readable medium of claim 42, wherein the processing system
2 further manipulates vehicle elements by:
3 receiving a first type of data from the at least one vehicle internetwork;
4 performing diagnostic and prognostic analysis on the first type of data;
5 transmitting a second type of data to the at least one vehicle internetwork in
6 response to the diagnostic and prognostic analysis.

1 49. An electromagnetic medium containing executable instructions which, when
2 executed in a processing system, cause the processing system to remotely
3 manipulate vehicle elements by:
4 coupling among a plurality of network elements including at least one
5 vehicle internetwork, at least one local site, and the Internet;

6 automatically providing secure interoperability among the plurality of
7 network elements in response to node information including configuration and
8 security information; and
9 remotely manipulating at least one function of the vehicle elements.

1 50. The electromagnetic medium of claim 49, wherein the processing system
2 further manipulates vehicle elements by hosting the at least one vehicle internetwork
3 on at least one vehicle selected from a group consisting of automobiles, trucks,
4 aircraft, trains, motorcycles, and marine vessels.

1 51. The electromagnetic medium of claim 49, wherein the processing system
2 further manipulates vehicle elements by coupling at least one gateway node of the at
3 least one local site to a remote user computer, wherein the at least one gateway node
4 is located on at least one site selected from a group consisting of a home, a service
5 station, a public parking lot, an automobile dealer facility, and an automobile service
6 facility.

1 52. The electromagnetic medium of claim 49, wherein the at least one function
2 includes vehicle control functions, security functions, diagnostic functions, and
3 network access functions.

1 53. The electromagnetic medium of claim 49, wherein the processing system
2 further manipulates vehicle elements by establishing communication among the at
3 least one node of a plurality of host vehicles.

1 54. The electromagnetic medium of claim 49, wherein the processing system
2 further manipulates vehicle elements by supporting data transfer and manipulation
3 among the plurality of network elements using at least one coupling among the at
4 least one vehicle internetwork and at least one external network, wherein the data
5 includes vehicle assembly data, service data, diagnostic data, maintenance data,
6 maintenance history data, security data, vehicle position data, vehicle operations
7 profile data, operator profile data, fleet management data, fleet reliability analysis
8 data, electronic mail, entertainment software, and targeted advertising data.

1 55. The electromagnetic medium of claim 49, wherein the processing system
2 further manipulates vehicle elements by:
3 receiving a first type of data from the at least one vehicle internetwork;
4 performing diagnostic and prognostic analysis on the first type of data;
5 transmitting a second type of data to the at least one vehicle internetwork in
6 response to the diagnostic and prognostic analysis.

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